

PATENT APPLICATION OF

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for

**TITLE : REVOLUTIONARY CONNECTIONS FOR SPARK PLUGS
AND SPARK PLUG CABLES**

FEDERALLY SPONSORED RESEARCH

Not Applicable

SEQUENCE LISTING OR PROGRAM

Not Applicable

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention relates to high voltage eletrical connections, and more specifically to connectors for attaching spark plug cables to spark plug terminals of internal combustion engines.

2. Discussion of Prior Art

Many varying types of connectors have been proposed and used for making electrical connections from spark plug cables to spark plug terminals. For many applications, including most automotive applications, the related art enumerated in the following provide the field with improvement by certain manner:

1. 1,245,931(Lanman) 2. 1,376,844(Weber) 3. 1,509,224 (9/1924-Berthold)
4. 1,792,866(2/1931-Rabazzaner) 5. 1,835,000(12/1931-Berthold)
6. 1,911,395(5/1933-Rowley) 7. 1,933,304(10/1933-Bell)
8. 2,301,570(Nowosielski) 9. 2,323,399(Jacobi) 10. 2,382,805(Mosthaf)
11. 2,666,423(1/1954-Johnson Jr.) 12. 2,685,872(Berstler)
13. 2,686,511(Platner) 14. 2,904,769(9/1959-Sampson et al.)
15. 3,076,113(Candelise) 16. 3,128,139(Estes)
17. 3,223,963(12/1965-Ravey et al) 18. 3,359,526(12/1967-Bakker)
19. 3,431,534(3/1969-Schrader et al.) 20. 3,435,404(3/1969-Kato)
21. 3,803,529(4/1974-Bohrig et al.) 22. 3,845,459(Normann)
23. 3,914,003(Loy) 24. 4,145,106(3/1979-Livingston)
25. 4,443,047(Hofmann) 26. 4,497,532(2/1985-Bezusko et al.)
27. 4,614,392(Moore) 28. 4,621,881(11/1986-Johansson et al.)
29. 4,671,586(6/1987-Debolt) 30. 4,810,198(3/1989-Sturdevan)
31. 4,886,473(12/1989-Germ) 32. 4,997,380(3/1991-Etienne et al.)
33. 5,053,092(10/1991-Lachman) 34. 5,127,840(7/1992-Bezusko et al.)
35. 5,274,298(12/1993-Cassidy et al.) 36. 5,297,971(3/1994-Nitta et al.)
37. 5,332,394(7/1994-Frost) 38. 5,340,323(8/1994-Imanishi et al.)
39. 5,421,736(6/1995-Imanishi et al.) 40. 5,813,872(Evans et al.)

yet none of the above cited references teach a solution to the original problem which is the connection itself. Apparently the existing prior art endeavor to develop improvement in one end of the connection while leaving the other end unattended. A connection, a coupling or a junction are supposed to have at least two or more components before they are so termed, it is a common practice that all the components be coordinated and matched in order to refine upon the connections. By modifying just one end without synchronizing the other usually will turn out endless effort, the design and configuration of the spark plug terminals remain pretty much the same since early this century, numerous prior art contemplated a solution to the problem by only refinishing the spark plug cable terminals to compromise, when in fact this is not the case solving the problem.

SUMMARY

Accordingly, an essential object of the present invention is to provide a constr-

uction whose electrical and mechanical contact will not diminish adversely over time as the result of vibration and high temperature; it is a further object of the invention to prevent a false sensation that a properly seated connection has been achieved; it is yet a further object to provide an easy step for deattaching connections by pressing and turning instead of twisting and pulling commonly used in the related art, while the latter exasperates the problem of difficulty; it is another advantage of the invention to provide flexibility for the connections' endurance.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a conventional spark plug;

FIG. 2 is a side view of the spark plug having the improved terminal according to the present invention;

FIG. 3 is a top view of the spacer having inner diameter $\pm 6\text{mm}$, diameter $\pm 9\text{mm}$;

FIG. 4 is a side view of the coiled spring having free height $\pm 14\text{mm}$, diameter $\pm 9\text{mm}$;

FIG. 5 is a side view of the spark plug terminal having the cotter pin installed, cotter pin is $\pm 9\text{mm}$ in length;

FIG. 5A is a top view of the spark plug terminal having the cotter pin installed;

FIG. 6 is a side view of the spark plug terminal after being assembled; the cotter pin, the spacer and the coiled spring are installed on the terminal respectively;

FIG. 7 is a side view of a conventional spark plug cable, a spark plug cable terminal and a stationary spark plug cover which is attached to the spark plug cable, the cover is not numbered since it is only shown as illustration;

FIG. 7A is a side view of a sliding spark plug cover; two dotted lines showing a sleeve-hole for the spark plug cable and the spark plug cable terminal;

FIG. 7B is a top view of the sliding spark plug cover showing said sleeve-hole;

FIG. 8-8A show a front and a rear view of the the slotted spark plug cable terminals having the sliding spark plug covers being slid down to expose said spark plug cable terminals;

FIG. 8B is a top view of FIG. 8 and FIG. 8A; and

FIG. 9 is a side view of the slotted spark plug cable terminal being connected to

the fully assembled spark plug terminal; the sliding spark plug cover is not shown here.

REFERENCE NUMERALS IN DRAWINGS

10 : cotter pin 12 : spacer 14 : coiled spring 16 : sliding spark plug cover

18 : spark plug cable 20 : spark plug cable terminal 22 : slots 24 : sleeve-hole

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, FIG. 1 shows a conventional spark plug having a conventional terminal, FIG. 2 shows the spark plug terminal being completely assembled; Cotter pin 10, spacer 12 and coiled spring 14 are made out of material that is able to withstand temperatures of up to 650° F and Nickel plated as in the present manufacturing process to prevent oxidation; cotter pin 10 can be inserted or forged in the upper portion of the spark plug terminal by means commonly used in machine works. As to the contour of the slots 22, an automotive 12 volt light bulb socket will best describe it since it is rather literally difficult for sketching. Lastly, the sliding spark plug cover 16 is identical to the stationary spark plug cover shown in FIG. 7, except said cover 16 is incorporated by the manner in which said cover 16 can be slid while riding on the spark plug cable 18; to be more precise the sleeve-hole 24 which the spark plug cable 18 and spark plug cable terminal 20 penetrate will be enlarged slightly enough so that the cover 16 will be able to slide back and forth along the spark plug cable 18 while still maintains good insulation.

OPERATION

The invention provides three simple steps to connect and disconnect spark plug cables 18 from spark plugs. For deattaching hold the sliding spark plug cover 16 and slide it away from the spark plug toward yourself until the spark plug cable terminal 20 is exposed, secondly hold said terminal 20, start to press and turn counterclockwise to release the terminal 20 from the cotter pin 10 which is incorporated in the spark plug terminal FIG.2 and FIG. 6, since the spacer 12 adjacent to the cotter pin 10 is spring loaded, the spark plug cable terminal will be pushed out by the spacer 12 as long as the slots 22 clear the cotter pin 10. For connecting the spark plug cable terminal 20 to the spark plug terminal FIG.2 and FIG. 6, hold and slide the sliding spark plug cover 16 until the terminal 20 is exposed, secondly hold said terminal 20 to engage with the cotter pin 10 in the spark plug terminal, there is a definite sensation feedback when the terminal slots 22 are engaged with the cotter pin 10, hold said terminal 20, start to press and turn clockwise, there is another

feedback sensation when the spark plug cable terminal 20 is properly hooked up by the cotter pin 10 and fully seated, lastly slide the spark plug cover 16 toward the spark plug away from yourself until said cover 16 is fully seated on the spark plug. One major problem arises with conventional spark plug cable systems, in that removal of the spark plug cable from the spark plug is frequently difficult, in most situations of limited accessibility, mechanics often choose to yank on spark plug cables a considerable distance away from the spark plug terminals, causing fatigue to the electrical connections within the spark plug cables. The advantage of the present invention can be translated into anticipation of much less problem of difficulty mechanics will encounter in the related field.